TECHNICAL CODE

BASIC CIVIL WORKS -
PART 3: MICRO TRENCH

Developed by

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Development of technical codes

The Communications and Multimedia Act 1998 ('the Act') provides for Technical Standards Forum designated under section 184 of the Act or the Malaysian Communications and Multimedia Commission ('the Commission') to prepare a technical code. The technical code prepared pursuant to section 185 of the Act shall consist of, at least, the requirement for network interoperability and the promotion of safety of network facilities.

Section 96 of the Act also provides for the Commission to determine a technical code in accordance with section 55 of the Act if the technical code is not developed under an applicable provision of the Act and it is unlikely to be developed by the Technical Standards Forum within a reasonable time.

In exercise of the power conferred by section 184 of the Act, the Commission has designated the Malaysian Technical Standards Forum Bhd (MTSFB) as a Technical Standards Forum which is obligated, among others, to prepare the technical code under section 185 of the Act.

A technical code prepared in accordance with section 185 shall not be effective until it is registered by the Commission pursuant to section 95 of the Act.

For further information on the technical code, please contact:

**Malaysian Communications and Multimedia Commission (MCMC)**
MCMC Tower 1
Jalan Impact
Cyber 6
63000 Cyberjaya
Selangor Darul Ehsan
MALAYSIA

Tel: +60 3 8688 8000
Fax: +60 3 8688 1000
http://www.mcmc.gov.my

OR

**Malaysian Technical Standards Forum Bhd (MTSFB)**
Malaysian Communications & Multimedia Commission (MCMC)
Off Persiaran Multimedia
Jalan Impact
Cyber 6
63000 Cyberjaya
Selangor Darul Ehsan
MALAYSIA

Tel: +60 3 8320 0300
Fax: +60 3 8322 0115
http://www.mtsfb.org.my
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Committee representation

This technical code was developed by the Fixed Network Facilities Sub Working Group under the Network and Broadcast Infrastructure and Facilities Working Group of the Malaysian Technical Standards Forum Bhd (MTSFB) which consists of representatives from the following organisations:

Core MTX Sdn Bhd
Digi Telecommunications Sdn Bhd
edotco Group Sdn Bhd
Malaysian Digital Economy Corporation
Maxis Bhd
Redsun Engineering Sdn Bhd
Telekom Malaysia Berhad
TIME dotcom Bhd
U Mobile Sdn Bhd
Universiti Teknikal Malaysia
Foreword

This technical code for Basic Civil Works - Part 3: Micro Trench ('this 'Technical Code') was developed pursuant to section 95 and section 185 of the Act 588 by the Malaysian Technical Standards Forum Bhd (MTSFB) via its Fixed Network Facilities Sub Working Group under the Network and Broadcast Infrastructure and Facilities Working Group.

The Basic Civil Works documents consist of the following parts:

Part 1: General Requirements

Part 2: Open Trench

Part 3: Micro Trench

Part 4: Horizontal Directional Drilling

These series of Technical Codes shall replace SKMM/G/01/09, Guideline on the Provision of Basic Civil Works for Communications Infrastructure in New Development Areas.

This Technical Code (Part 3: Micro Trench) specifies the requirements for micro trench works for the installation and maintenance of communications network facilities. This Technical Code shall be read together with MCMC MTSFB TC G025-1:2020 for the common requirements.

This Technical Code shall continue to be valid and effective from the date of its registration until it is replaced or revoked.
1. **Scope**

   This Technical Code specifies requirements for micro trench works for the installation and maintenance of communications network facilities which covers:

   a) planning for micro trench works;

   b) technical specifications; and

   c) installation procedures.

2. **Normative references**

   The following normative references are indispensable for the application of this Technical Code. For dated references, only the edition cited applies. For undated references, the latest edition of the normative references (including any amendments) applies.

   MCMC MTSFB TC G025-1:2020, *Basic Civil Works - General Requirements*

3. **Abbreviations**

   For the purpose of this Technical Code, the following abbreviation applies:

<table>
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<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>GI</td>
<td>Galvanised Iron</td>
</tr>
<tr>
<td>HDPE</td>
<td>High Density Polyethylene</td>
</tr>
<tr>
<td>NFP</td>
<td>Network Facilities Provider</td>
</tr>
<tr>
<td>PVC</td>
<td>Poly Vinyl Chloride</td>
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4. **Terms and definitions**

   The terms and definitions are as specified in MCMC MTSFB TC G025-1:2020.

5. **Planning for micro trench works**

   Planning of micro trench works shall be done as described in MCMC MTSFB TC G025-1:2020.

6. **Technical specifications**

   The micro trench works shall be done according to works and material specifications as follows.

   6.1 **Trenching**

   The micro trench technology shall be applied on routes that involve surfaces such as roads (asphalt), sidewalks (pavement) and other concrete-based surface. It is normally carried out by cutting a groove at a depth of 300 mm and width of 50 mm as shown in Figure 1.
6.2 Duct

The maximum diameter of duct allowed shall be 50 mm. There are various types of duct to be used for micro trench as follows:

a) High Density Polyethylene (HDPE) type duct;
   i) smooth wall duct with direct installed microducts (refer Figure 2);
   ii) bundled microducts (refer Figure 3);
   iii) individual microduct (refer Figure 4); and

b) Galvanised Iron (GI) pipe (refer Figure 5).
An insulated metallic or any other metal-based wire shall be built-in inside the HDPE duct for precise route detection.
6.3 End cap

End caps shall always be used during the laying, storing and transporting of microducts to prevent the penetration of water or dust. They shall be removable and reusable, with diameter matched to the microducts as shown in Figure 6.

![Figure 6. End cap for microducts](image)

6.4 Connector

Connectors as shown in Figure 7 are used as sleeves for connecting 2 microducts and they can be removable and reusable. They should not affect the tensile strength and pressure of the microducts. Straight connectors are used to join 2 microducts that are similar in diameter, while "reducers" are used for different diameter.

![Figure 7. Microduct connectors](image)

7. Installation procedure

7.1 Road cutting

Micro trench is performed using an asphalt cutting machine as shown in Figure 8. Cutting speed may depend on the type of machine used. The route shall avoid any sharp turns in direction. Where such condition is unavoidable, the micro trench shall be made by angled cutting so as to comply with the minimum bending radius required for the microducts as illustrated in Figure 9.
Where it is possible, the trenching shall be done on the road marker line. Upon reinstatement, the road marker line should be repainted according to the specifications by the relevant authorities.

In a condition where the trenching needs to be done on the carriage way, the project manager shall refer to the relevant authorities before work starts.

To ensure the trench is cut in a straight line, the trenching line should be suitably marked to guide the cutting.

### 7.2 Groove cleaning and drying

After trenching, the bottom of the trench shall be cleaned. It shall be cleared from any loose stones or pebbles which could exert undue pressure and force on the wall of the microducts, causing damage and deformation to microducts. The following procedures shall be carried out after cutting the groove:

a) remove debris from the sides of the excavation;

b) remove adjacent paving materials which were damaged as a result of excavation; and

c) clean the bottom of the trench.
7.3 Laying of duct

The duct comes in various sizes with very low friction level. The duct is a direct-buried type with high tensile strength and crush resistance.

The recommended distance between 2 points should not exceed 250 m as shown in Figure 10.

![Figure 10. Recommended distance between two manholes](image)

Before laying duct into the bottom of the trench, a sand bedding of approximately 20 mm in thickness shall be laid to provide cushion or absorption mechanism for the ducts. After laying the duct, a further topping using sand up to 60 mm of thickness shall be done to absorb mechanical shock forces from the top of road surface.

7.4 Lead-in duct to manhole

Connection to manhole or pit shall be accomplished by means of a conventional excavation with appropriate length. The dropping of the trench should be gradual from the access point to the manhole or pit in such a way to comply with minimum duct or cable bend radius requirements as shown in Figure 11.

Inside the manhole or pit, individual duct shall be separated and located at a suitable horizontal distance and they shall extend the length of the microducts inside the manhole or pit. Microducts and cable slack for each manhole is required according to the network design.

![Figure 11. Lead-in duct side-view diagram](image)

7.5 Backfilling

Backfilling shall satisfy the following performance requirements:

a) volumetric stability;

b) bond and adhere to the walls of the trench;

c) the entire excavation shall be fully filled and without different settling; and

d) the backfilling material shall be readily removable for future maintenance works on the microducts.
A suitable measure shall be taken to maintain the cable geometry and avoid undesired floating of the ducts during backfilling process.

Backfilling shall be performed according to the specifications as described in Figure 1.

The properties of the asphalt shall be similar to the existing surface for reinstatement.

8. Completion of works

The completion of works procedure shall be as specified in MCMC MTSFB TC G025-1:2020.
Acknowledgements

Members of the Fixed Network Facility Sub-Working Group

Mr Mohd Yusairi Abu Hassan (Chairman)  
Telekom Malaysia Berhad

Mr Zulkefli Zabri (Vice Chairman)  
Maxis Bhd

Mr Sufian Sulaiman (Secretary)  
Telekom Malaysia Berhad

Mr Muhaimin Mat Salleh/  
Malaysian Technical Standards Forum Bhd

Mr Mohamad Hafiz Halal (Secretariat)  

Mr Hairul Razi Hamdan  
Core MTX Sdn Bhd

Mr Ahmad Fadzly Misron  
Digi Telecommunications Sdn Bhd

Mr Jaizan Zuki  
edotco Group Sdn Bhd

Mr Mokhtar Daud  
Malaysian Digital Economy Corporation

Mr Mohd Nazim Mahmud/  
Maxis Bhd

Mr Md Shaiful Zainal  
Redsun Engineering Sdn Bhd

Mr See Boon Leng/  

Mr Leong Woon Min/  

Mr Ivan Leong Yoon Khong  
Telekom Malaysia Berhad

Mr Najib Fadil Mohd Bisri/  

Mr Mohd Razman Rusli/  

Mr Mohd Haslishah Jalil/  

Mr Md Rawi Abu/  

Mr Mohd Ariff Arifen/  

Mr Noor Fadlee Muhammad Hairi/  

Mr Mohd Syahrir Ribuan  

Mr Abdulhadi Wahid/  
TIME dotcom Bhd

Mr Mohd Faiz Hasmi  
U Mobile Sdn Bhd

Mr Roslan Mohd Kasim  
Universiti Teknikal Malaysia Melaka

Ir Ts Dr Mohd Fauzi Ab Rahman/  

Ir Dr Anas Abdul Latiff/  

Mr Muhammad Taufiq Ahmad/  

Mr Mohd Adzimmuddin Mohd Nor Azami

By invitation:

Mr Husni Azam Yusof/  
Allo Technology Sdn Bhd

Mr Jeysudason  

Mr Than Kok How  
Emtelle Asia Pacific (M) Sdn Bhd

Mr Mohd Hafiz Ramli/  
Dewan Bandaraya Kuala Lumpur

Mr Affendy Ariffin  
Jabatan Kerja Raya Malaysia

Mr Chandiramohan Ranjithan/  
SMARTSEL Sdn Bhd

Ms Hazmatul Farha Hamzah/  
Zettabits Technologies (M) Sdn Bhd

Mr Muhammad Aidil Razak  

Mr Zaharin Mohd Nadzri  

Mr Kuo Hai Ann